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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/716,254 | 11/17/2003 | Hai Deng | 42P17284 | 6503 |

7590

12/06/2006

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| EXAMINER |
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OLSEN, ALLAN W

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| ART UNIT | PAPER NUMBER |
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1763

DATE MAILED: 12/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/716,254

Applicant(s)

DENG, HAI

Examiner

Allan Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-16 and 18-46 is/are pending in the application.
- 4a) Of the above claim(s) 29-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-16 and 18-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 March 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 26, 2006 has been entered.

Election/Restrictions

Claim 29-46 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on March 16, 2006.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the reference character 215 that is not mentioned in the description and because figure 6 does not include the reference sign "605" mentioned in the description.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), and/or amendments to the specification adding the reference character to the description, in

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compliance with 37 CFR 1.121(b), are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 3-7, 14 and 24 are objected to because of the following informalities:

Claims 3-7 have been orphaned by the cancellation of claim 2

In claim 14, "aegogel" should read -- aerogel --;

In claim 24, "tetraethozysilane", "tetramethozxysilane" and "tetrapropozysilane", should read, respectively, --tetraethoxysilane--, --tetramethoxysilane-- and --tetrapropoxysilane--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first and second paragraphs of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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112 1st:

Claims 1, 3-16 and 18-28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claim 1, the specification does not appear to disclose a removing a first amount of liquid from a wet gel-zeolite composite, wherein the amount of liquid removed is between 5% and 95%.

Regarding claims 12-14, the originally filed application does not appear to disclose etching a trench and via into a wet gel-zeolite composite. Regarding claims 25 and 26, the specification does not appear to disclose a sol comprising a surfactant.

112 2nd:

Claims 3-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3-7 all are dependent upon claim 2. There is insufficient antecedent basis for this claim dependency because claim 2 has been cancelled.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3 4, 6, 8, 9, 11 and 15, 17-27 are rejected under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ogihara's et al. US Patent Application Publication 2004/0091419 (hereinafter, Ogihara).

Ogihara teaches creating a colloidal zeolite-sol. Ogihara teaches the sol may comprise up to 30 parts by weight of zeolite to 1 part of silane. Ogihara teaches spin coating the zeolite -sol onto a semiconductor substrate. Ogihara teaches treating the sol under the same conditions that applicant teaches. For example, Ogihara and applicant both dry the zeolite material, by heating under the same conditions, which results in: oxidizing the zeolite-sol; forming a gel-zeolite composite; calcining the gel zeolite-composite; forming an aerogel-zeolite composite. Ogihara teaches the zeolite-sol comprises silica. Ogihara teaches the sol comprises an alcohol such as methanol, ethanol and propanol. Ogihara teaches the sol comprises HCl. Ogihara teaches the sol comprises TEOS. See paragraphs: [0032], [0035], [0037], [0055], [0076], [0078], [0089], [0101], [0112] and [0126].

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Regarding the newly added limitation that requires removing a first amount, between 5% and 95%, of liquid from the wet gel-zeolite composite, the examiner notes that Ogihara teaches a stepwise drying process in paragraph [0126]. The process includes the following 4 stages of drying: 1) spinning for 1 minute at 4000 RPM; 2) heating for 2 minutes at 120°C; 3) further heating for 3 minutes at 250°C; and, 4) heating for 1 hour at 450°C. Ogihara does not explicitly disclose the percentage of liquid that is removed by each step. However, it is reasonable to conclude that at least one of Ogihara's first three drying stages would yield a composite in which between 5% and 95% of the liquid has been removed. When a reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention but has basis for shifting the burden of proof to applicant, a 102/103 rejection in the alternative is appropriate, as in *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980). See MPEP §§ 2112- 2112.02.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5, 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogihara.

Ogihara does not teach using vacuum conditions to dry the zeolite material.

It would have been obvious to one skilled in the art to dry the zeolite material of Ogihara under reduced pressure condition because this is well known and widely used means of controlling the rate of drying.

Claims 12-14 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogihara in view of US Patent 6,808,867 issued to Doshi et al. (hereinafter, Doshi).

Ogihara does not teach the temporal relationship between the patterning and calcination of the gel-zeolite composite. Ogihara does not teach dip-coating the zeolite-sol.

Doshi teaches a method wherein sol gel layers are patterned before they undergo calcinations (column 9, lines 56-58). Doshi teaches dip-coating of sol-gels (column 8, lines 28-29).

It would have been obvious to one skilled in the art to incorporate Doshi's methodology when using Ogihara's method to form a porous low k dielectric layer, and thereby pattern Ogihara's gel-zeolite composite before it undergoes calcinations, because Doshi's method incorporates photolithographic properties into the sol-gel layer itself thereby eliminating all the steps that would be associated with providing and patterning an overlying photoresist layer.

It would have been obvious to dip-coat Ogihara's zeolite-sol because Doshi teaches that dip-coating and spin-coating are functionally equivalent with respect to the formation of sol-gel thin films.

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogihara in view of Martin's US Patent Application Publication 2002/0197645 (hereinafter, Martin).

Ogihara does not teach dip-coating the zeolite-sol.

Martin teaches methods of coating layers of zeolite material on substrates (see [0217] and [0223]).

It would have been obvious to one skilled in the art to dip-coat the zeolite sol of Ogihara because Martin teaches that dip-coating and spin-coating are functionally equivalent methods of depositing zeolite materials.

Response to Arguments

Applicant's arguments filed September 26, 2006 have been fully considered but they are not persuasive. Applicant argues:

"amended claim 1 includes a first amount of liquid in the range of 5% to 95%, which is included within "any amount of liquid" and "it is apparent that Ogihara does not contemplate extraction of some of the liquid, i.e. in a range of 5% to 95% as in applicant's claim 1, to form a wet gel".

This argument was addressed in the above rejection under 102. Ogihara's teaching, in paragraph [0126], of a multi-step drying process is noted as being of particular significance.

Applicant's arguments regarding claim 12 are moot in view of the new ground of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M, W and F: 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Allan Olsen
Primary Examiner
Art Unit 1763

A handwritten signature in black ink, appearing to read "Allan Olsen", is located below the typed name and title.